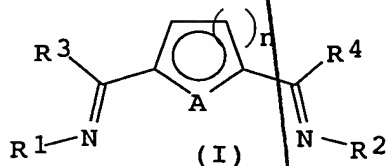


We claim:

1. A compound of the formula (I)



where the symbols have the following meanings:

- 15 A is a nonmetal selected from among N, S, O and P,
- R¹ is a radical of the formula NR⁵R⁶,
- 20 R² is a radical of the formula NR⁵R⁶ or NR⁷R⁸, alkyl, aryl or cycloalkyl,
- R⁵ and R⁶ together with the N atom form a 5-, 6- or 7-membered ring in which one or more of the -CH- or -CH₂- groups may be replaced by suitable heteroatom groups and which may be saturated or unsaturated and unsubstituted or substituted or be fused with further carbacyclic or heterocarbacyclic 5- or 6-membered rings which may in turn be saturated or unsaturated and substituted or unsubstituted, and
- 25 R⁷ and R⁸ are, independently of one another, alkyl, aryl or cycloalkyl radicals,
- and
- 35 R³, R⁴ are, independently of one another, H or alkyl, aryl or cycloalkyl radicals,
- and
- 40 n is 1 or 2.
2. A compound as claimed in claim 1, wherein the radicals of the formula NR⁵R⁶ are pyrrole radicals or radicals derived from pyrrole in which one or more -CH- groups in the pyrrole ring may be replaced by nitrogen and which may be unsubstituted or substituted or fused with further carbacyclic or
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heterocarbacyclic 5- or 6-membered rings which may in turn be saturated or unsaturated and substituted or unsubstituted.

3. A compound as claimed in claim 2, wherein the pyrrole radicals or radicals derived from pyrrole are substituted in the 2 and 5 positions by C₁-C₆-alkyl groups which may be linear, branched or substituted by heteroatoms, and/or by aryl groups which may be unsubstituted or in turn substituted by heteroatoms or C₁-C₆-alkyl groups which may be heteroatom-substituted.

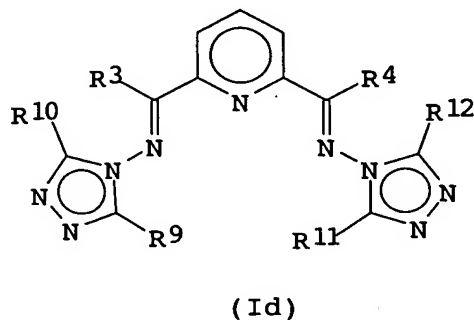
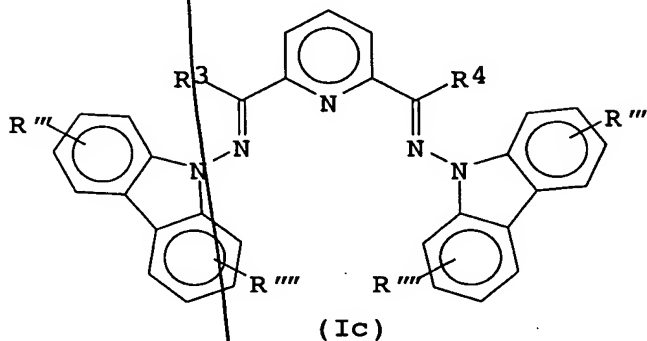
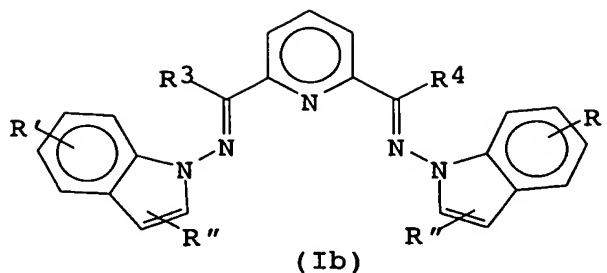
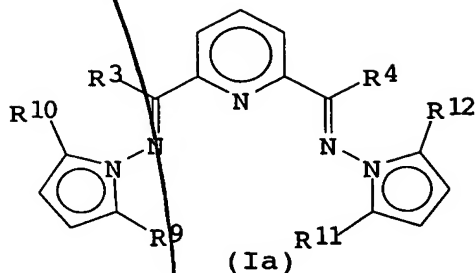
A compound as claimed in claim 1 or 2, wherein the pyrrole radicals or radicals derived from pyrrole are substituted in the 2 or 5 position by electron-withdrawing radicals selected from among

- halogen,
- NO₂,
- sulfonates selected from among
 - SO₃R*,
 - SO₃SiR*₃ and
 - SO₃⁻ (H-NR*₃)⁺,
 - trihalomethyl,

where R* may be identical or different and are selected from among H, C₁-C₁₀-alkyl, C₆-C₂₀-aryl and C₅-C₈-cycloalkyl.

5. A compound as claimed in any of claims 1 to 4, wherein, in the formula (I) of claim 1, A = N and n = 2.

6. A compound as claimed in claim 5 which corresponds to one of the formulae (Ia), (Ib), (Ic) and (Id):



where

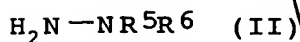
R^3 , R^4 are, independently of one another, H or alkyl or aryl radicals,

and

R^9 , R^{10} , R^{11} and R^{12} are, independently of one another, C_1 - C_6 -alkyl radicals, and

R' , R'' , R''' , R'''' are H or alkyl, aryl or cycloalkyl radicals.

7. A process for preparing symmetrical compounds of the formula (I) of claim 1 in which $R^1 = R^2$ by reacting compounds of the formula (II)

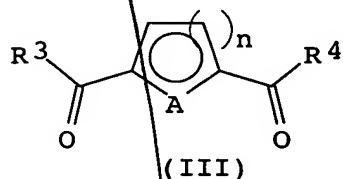


where

R^5 and R^6 together with the N atom form a 5-, 6- or 7-membered ring in which one or more of the $-CH-$ or $-CH_2-$ groups may be replaced by suitable heteroatom groups and which may be saturated or unsaturated and unsubstituted or substituted or fused with further carbacyclic or

heterocarbacyclic 5- or 6-membered rings which may in turn be saturated or unsaturated and substituted or unsubstituted,

with compounds of the formula (III)



where

R^3 , R^4 are, independently of one another, H or alkyl, aryl or cycloalkyl radicals, and

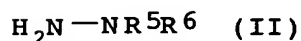
A is S, N, O or P, and,

n is 1 or 2, and

in a single-stage process under acidic reaction conditions in alcoholic solution or in the presence of a trialkylaluminum catalyst in an aprotic solvent in a ratio of the compound of the formula (II) to the compound of the formula (III) of 2:0.7-1.3.

8. A process for preparing unsymmetrical compounds of the formula (I) of claim 1 in which $R^1 \neq R^2$ in a two-stage process in which

a) in a first step, compounds of the formula (II)

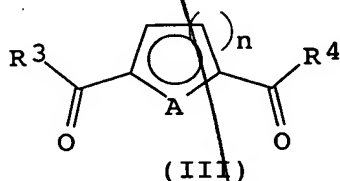


where

R^5 and R^6 together with the N atom form a 5-, 6- or 7-membered ring in which one or more of the -CH- or -CH₂- groups may be replaced by suitable heteroatom groups and which may be saturated or unsaturated and substituted or unsubstituted or fused with further carbacyclic or heterocarbacyclic 5- or 6-membered rings which may in

turn be saturated or unsaturated and substituted or unsubstituted,

are reacted with compounds of the formula (III)



where

R³, R⁴ are, independently of one another, H or alkyl, aryl or cycloalkyl radicals, and

A is S, N, O or P, and

n is 1 or 2,

in a ratio of the compounds of the formula (II) to the compounds of the formula (III) of 1:0.8-1.2 under acidic conditions in alcoholic solution to form the corresponding monoimine and the solvent is subsequently removed under reduced pressure,

and

b) the monoimine is, in a second step, reacted with compounds of the formula (II) which differ from the compounds of the formula (II) used in step a) or with compounds of the formula (IV)

H₂N-NR⁷R⁸ (IV)

where

R⁷ and R⁸ are, independently of one another, alkyl, aryl or cycloalkyl radicals,

or with amines of the formula (V)

R¹³-NH₂ (V)

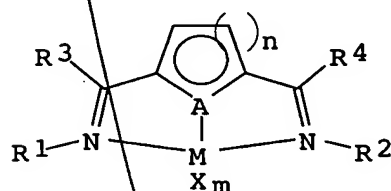
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where

R^3 is an alkyl, aryl or cycloalkyl radical,

in aprotic solution in the presence of a trialkylaluminum catalyst in a ratio of the monoimine to the compound of the formula (II), (IV) or (V) of 1:0.8-1.2.

9. A compound of the formula (VI),



(VI)

where the symbols have the following meanings:

A is a nonmetal selected from among N, S, O and P,

R^1 is a radical of the formula NR^5R^6 ,

R^2 is a radical of the formula NR^5R^6 or NR^7R^8 , alkyl, aryl or cycloalkyl,

R^5 and R^6 together with the N atom form a 5-, 6- or 7-membered ring in which one or more of the $-CH-$ or $-CH_2-$ groups may be replaced by suitable heteroatom groups and which may be saturated or unsaturated and unsubstituted or substituted or be fused with further carbacyclic or heterocarbacyclic 5- or 6-membered rings which may in turn be saturated or unsaturated and substituted or unsubstituted, and

R^7 and R^8 are, independently of one another, alkyl, aryl or cycloalkyl radicals,

and

R^3 , R^4 are, independently of one another, H or alkyl, aryl or cycloalkyl radicals,

n is 1 or 2,

M is a transition metal of groups 7, 8, 9 or 10 of the Periodic Table of the Elements,

and

X is a halide or a C₁-C₆-alkyl radical and

m is the valence of the metal.

10 10. A compound as claimed in claim 9, wherein
M = Fe or Co and m = 2.

Sub A₂ 11. A process for preparing compounds of the formula (VI) of
15 claim 9 by reacting corresponding compounds of the formula
(I) as claimed in any of claims 1 to 5 with salts of
transition metals of groups 7, 8, 9 or 10 of the Periodic
Table of the Elements.

20 12. The use of compounds of the formula (VI) as claimed in claim
9 or 10 as catalysts in a process for the polymerization of
unsaturated compounds.

25 13. A process for preparing polyolefins by polymerization of
unsaturated compounds in the presence of an activator and a
compound of the formula (VI) as claimed in claim 9 or 10 as
catalyst.

Sub A₃ 14. A process as claimed in claim 13, wherein the catalyst is
30 present in the polymerization either as a homogeneous
solution or in heterogeneous form immobilized on a support.

35 15. A process as claimed in claim 13 or 14, wherein
methylaluminoxane or N,N-dimethylanilinium
tetrakis(pentafluorophenyl)borate is used as activator.

40 16. A process as claimed in any of claims 13 to 15, wherein an
unsaturated compound or a combination of unsaturated
compounds selected from among ethylene, C₃-C₂₀-monoolefins and
cycloolefins is used.

45 17. A process as claimed in any of claims 13 to 15, wherein
acrylonitrile and styrene are used as comonomers or the
following combinations of unsaturated compounds are employed:
ethylene and an alkyl acrylate, in particular methyl
acrylate, ethylene and an acrylic acid, ethylene and carbon
monoxide, ethylene, carbon monoxide and an acrylate ester or

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an acrylic acid, in particular methyl acrylate, and also propylene and alkyl acrylate, in particular methyl acrylate.

18. A polyolefin which can be prepared in a process as claimed in any of claims 1 to 17.

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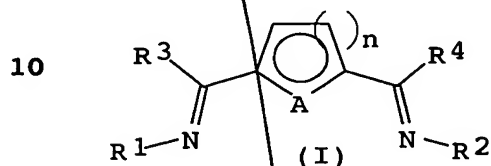
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Catalysts for the polymerization of unsaturated compounds

Abstract

Bisimine compounds of the formula (I)



15 where the symbols have the following meanings:

A is a nonmetal selected from among N, S, O and P,

R¹ is a radical of the formula NR⁵R⁶,

20

R² is a radical of the formula NR⁵R⁶ or NR⁷R⁸, alkyl, aryl or cycloalkyl,

25

R⁵ and R⁶ together with the N atom form a 5-, 6- or 7-membered ring in which one or more of the -CH- or -CH₂- groups may be replaced by suitable heteroatom groups and which may be saturated or unsaturated and unsubstituted or substituted or be fused with further carbacyclic or heterocarbacyclic 5- or 6-membered rings which may in turn be saturated or unsaturated and substituted or unsubstituted, and

30

R⁷ and R⁸ are, independently of one another, alkyl, aryl or cycloalkyl radicals,

35

and

R³, R⁴ are, independently of one another, H or alkyl, aryl or cycloalkyl radicals,

40

and

n is 1 or 2,

45 are used to prepare bisimidinato complexes which can be used in the polymerization of unsaturated compounds.

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